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Is the Resilience Scale for Adults measuring well-established personality constructs?

Hannah Vinner

Hovedoppgave innlevert ved psykologisk institutt

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Abstract

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Title: Nothing new under the sun? Is the resilience scale for adults measuring well-established personality constructs?

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Aims of the study:
There is an ongoing debate in the field of resilience, as to what extent personality is involved in resilience. The Resilience Scale for Adults (RSA) is a resilience scale designed to capture resilience factors in three domains, namely individual dispositions, family cohesion and external social support outside the family. The present study explores the content of the RSA, with regard to possible construct overlap with personality. In addition RSA and a measure of the Five-Factor Model of personality (FFM) are compared with regard to their ability to account for variance in health related quality of life. The study is conducted in a population with spinal cord injuries (SCI) and multi traumas (MT). The aims of the study is to explore whether RSA accounts for variance in health related quality of life beyond FFM personality, whether RSA grasp social and external support factors involved in resilience, and whether RSA is a suitable measure for use in a population with severe physical injuries.

Methods: Data was collected in a follow up study, as part of a research project at Sunnaas Rehabilitation hospital (SHR). The data was collected by psychologists at SHR. All 75 patients in this study had SCI and/or MT. Measures of FFM personality (NEO-FFI), RSA and health related quality of life (SF-36) were administered four years after the patients were discharged from

SHR, while a measure of dispositional optimism (LOT-R) was administered at admission to SHR. Thus the design of the study is predominantly cross-sectional. Exploration of construct overlap between RSA and personality was done by inspecting the semantic content of the items constituting the scales.

Results: Inspection of item content of the RSA variables reveal that several RSA variables may predominantly measure well-established personality concepts such as FFM personality, optimism, self efficacy and locus of control, as underlying constructs. RSA perception of self and RSA perception of future were the variables from RSA accounting for most variance in health related quality of life. Inspection of item content of RSA perception of self suggested this variable may largely reflect FFM neuroticism. Items of RSA perception of future may possibly tap into personality constructs such as optimism, self-efficacy and locus of control. Thus, in the present study RSA did not seem to capture resilience factors related to family cohesion or external social support. Even so, RSA did account for health related quality of life beyond FFM personality. However incremental validity of RSA beyond FFM personality was largely due to RSA perception of future. Thus, results from the present study could challenge the uniqueness of the resilience construct as conceptualized by RSA, with regard to RSA resembling personality.

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1 Introduction

There are large individual differences in how people react to adversity, but recent research suggests that most people demonstrate resilience. Resilience is often thought to be a positive outcome, despite of adversity. But defining the resilience construct, and agreeing upon the factors constituting resilience is a widely recognized challenge (Bonanno & Diminich, 2013; Gill Windle, 2011). A hot topic in the resilience debate is the role of personality. Despite the ongoing debate on the makeup of resilience, scales for measuring resilience already exist. Studies have shown that some of the present resilience scales share substantial variance with personality (Friborg, Barlaug, Martinussen, Rosenvinge, & Hjemdal, 2005; Hjemdal, Friborg, & Stiles, 2012; Huey & Weisz, 1997; Waaktaar & Torgersen, 2010). This makes current the question of whether established personality frameworks for capturing individual differences, such as the Five-Factor model of personality (McCrae & Costa, 1997), could replace a specialized resilience scale. The present study will focus on The Resilience Scale for Adults (RSA) (Friborg, Hjemdal, Rosenvinge, & Martinussen, 2003). Construct overlap between RSA and personality, will be examined. In addition, the ability of RSA and FFM personality in accounting for health related quality of life in a population with spinal cord injury (SCI) or/and multiple traumas (MT) will be assessed. This is a unique population for studying resilience, as people with acquired SCI/MT have faced serious adversity, and might experience ongoing challenges in reconfiguring for a changed life situation. Since resilience is regarded a positive outcome following adversity, studying resilience in this population may add to our understanding of the resilience phenomenon.

1.1 Studying resilience in populations with acquired disabilities

In recent years, resilience has emerged as an increasingly popular field of study. However, there is a paucity of literature studying resilience in persons with physical disabilities in the rehabilitation settings (White, Driver, & Warren, 2008). The patients admitted to physical rehabilitation are facing severe challenges, since they may have acquired the injury in a life-threatening event, and also face challenges related to their sequele of a physical disability. Data in the present study is collected in a population with SCI/MT four years post-injury. Research document that acquiring severe physical injuries is statistically associated with difficulties in maintaining a stable psychological functioning, where mental disorders such as

post-traumatic stress disorder (Kennedy & Duff, 2001; Kennedy & Evans, 2001), anxiety (Kennedy & Rogers, 2000) and depression (Elliott & Frank, 1996; Kennedy & Rogers, 2000) contribute. On average people with SCI experience more emotional strain than the general population, but individual differences are large, and most people adapt well (Bonanno, Kennedy, Galatzer-Levy, Lude, & Elfstrom, 2012; Post & van Leeuwen, 2012; Quale & Schanke, 2010). Because of the extreme adversities these individuals are faced with when dealing with trauma of injury, chronic physical change, and loss of physical function, studying resilience in this population might capture a different aspect of resilience, than studying resilience in the general population (White et al., 2008).

1.2 What is resilience?

Despite a popularly held cultural belief, exposure to major life stressors does not have to cause severe long-time emotional consequences. After being exposed to highly aversive events, such as the death of a spouse, a serious accident, or natural disasters, some people emerge with no devastating long-time consequences, while others may suffer from psychological stress such as depression and anxiety. Not everybody is equally affected, and there are large individual differences in how people react to stress (Bonanno, Mancini, et al., 2012; Dickstein, Suvak, Litz, & Adler, 2010; Monden et al., 2014; Rutter, 1985). The phenomenon underlying these individual differences is referred to as resilience.
Resilience as a psychological term emerged in the 1970ties, when child clinicians began to notice how some children growing up in harsh conditions, such as poverty or maltreatment, later emerged as unexpectedly highly functional individuals. These children were annotated resilient children (Rutter, 1985). Researchers set out to explore which factors made these children resilient. This marks a shift of focus in clinical psychology, from the traditional deficit focus, which aims at identifying risk factors making people vulnerable, toward understanding healthy development despite risk (Gill Windle, 2011). Later on the resilience focus migrated to research on adult populations, but still the majority of literature on resilience is from studies of child populations.

The resilience concept is a compelling and popular concept, but agreeing upon a universally accepted definition and taxonomy has proven to be a challenge. One reason may be that the resilience concept originated in the field of child psychology, and directly migrated to the adult psychology without any adaptations or clarifications. Another reason may be that the

resilience concept derives from empirical findings, and currently no overreaching theoretical framework exists. Complicating matters further, the resilience term may either refer to an outcome, a process or a personality trait.

1.3 Resilience as outcome, process and trait

Resilience as an outcome is typically described as positive adaption after adversity. Most definitions of resilience as an outcome are typically centred on two key concepts, namely adversity and positive adaption (Fletcher & Sarkar, 2013). Adversity refers to circumstances associated with risk of disrupting normal adjustment (Luthar, Cicchetti, & Becker, 2000). Positive adaption refers to adapting better than expected, after being exposed to adversity (Luthar et al., 2000). Most researchers agree that both adversity and positive adaption must be evident in order to demonstrate a resilient outcome (Fletcher & Sarkar, 2013).

Resilience as a process can be described as the dynamic interplay of underlying factors leading to a resilient outcome, in a context of adversity (Luthar et al., 2000). Research on resilience as a process has moved away from identifying factors associated with resilience and is now occupied with understanding the mechanisms of how these factors operate (Gill Windle, 2011).

Resilience as a personality trait refers to relatively stable characteristics of the individual relating to how he or she adapts to challenges in the environment (Connor & Davidson, 2003; Fletcher & Sarkar, 2013). As trait resilience is conceptually related to personality, trait resilience can be assessed at any given time, and do not require prior exposure to adversity. In a review article on the resilience concept. Luthar et al. (2000) stresses the importance of differentiating between trait resilience and resilience as a process. A central debate among scientists within the resilience field is whether resilience as an outcome is mainly due to personality characteristics or to contextual factors such as social support. Bonanno and Diminich (2013) argue that in multivariate studies, only a small percentage of explained variance is attributable to personality. Conversely, Block and Kremen (1996) and Connor and Davidson (2003) conceptualizes resilience as stable individual traits.

1.4 Measuring resilience

As the resilience construct is not yet clearly defined, the fact that scales for assessing resilience readily exist could be problematic with regards to the construct validity of these scales. Since resilience scales contribute in evaluating interventions and policies effectiveness in promoting resilience, assessing prevalence of resilience, understanding the factors constituting resilience, and assessing resilience to guide interventions at an individual level, it is important to know what the scales are measuring (G. Windle, Bennett, & Noyes, 2011).

Critic has been raised at several of the existing resilience scales, claiming the scales to be relying too much on personality, and not grasping the full range of the resilience construct (Bonanno & Diminich, 2013). This critic originates from the previously mentioned debate on the importance of personality in resilience. Accordingly, whether one finds a resilience scale that measures personality to be a good or bad thing, will depend on whether one believes resilience to be due to dispositional factors in the individual. But the issue of resilience scales measuring trait resilience would also concern the construct validity of these resilience scales. If there is considerable construct overlap between trait resilience and personality, it would question the uniqueness of the trait resilience construct. And if some resilience scales mainly rely on personality traits, it makes current the question of the utility of the resilience scales, with regard to whether measures of general personality could be used interchangeably with the specialized resilience scales (Waaktaar & Torgersen, 2010). To test the utility of resilience scales, the predictive power of resilience scales and personality measurements could be compared.

1.5 Personality measurements

The five-factor model (FFM) of personality is a well validated method for capturing individual dispositional differences in how we relate to our environment, to others and to ourselves (McCrae & Costa, 1997). The FFM postulates to sufficiently describe individual differences using five personality factors; neuroticism, extroversion, openness, agreeableness and conscientiousness (McCrae & Costa, 1997). Personality influence how we adapt to our environment and the challenges we face (John, Robins, & Pervin, 2008) which makes personality assessment an alternative approach to assessing trait resilience. A low score on neuroticism, and high scores on extroversion, openness, agreeableness and conscientiousness

have been associated with resilience (Davey, Eaker, & Walters, 2003; Riolli, Savicki, & Cepani, 2002).

Life Orientation Test-Revised (LOT-R) is a well established measure of dispositional optimism (Scheier et al., 1994). This concept measure expectations of positive or negative outcomes. Scheier et al. (1994) generalize that optimists may use more adaptive coping strategies compared to pessimists. Thus optimism could be involved in resilience processes. Self efficacy may be regarded as a personality disposition (Ajzen, 2002). Self-efficacy refers to an individual's belief in his or her capacity to execute behaviours necessary to reach their goals (Bandura, 1977). Locus of control reflects individuals generalized expectations of to what degree they feel that their behaviour can impact outcomes (Rotter, 1966). Judge, Erez, Bono, and Thoresen (2002) argue that self efficacy and locus of control are conceptually related, and are also related to FFM neuroticism, and thus should be regarded as personality dispositions. Optimism, self-efficacy and locus of control have all been linked to health related quality of life and adaption after SCI e.g., (Boschen, Tonack, & Gargaro, 2003; Middleton, Tran, & Craig, 2007; Peter, Muller, Cieza, & Geyh, 2012; van Leeuwen, Kraaijeveld, Lindeman, & Post, 2012; Vassend et al., 2011)

1.6 The Resilience Scale for adults

The present study will focus on the construct validity and the incremental validity of The Resilience Scale for Adults (RSA) in relation to personality. Construct validity can be defined as to what degree the scale is measuring the theoretical construct thought to be reflected in the scale (Bordens & Abbot, 2011). Incremental validity is the ability of a measure to predict standing on a criterion measure, beyond other predictors (Bordens & Abbot, 2011). Incremental validity can thus be used to determine whether the implementation of a new measurement will give information about a criterion, not gained through existing measurements. RSA is a resilience scale designed to measure protective factors promoting resilience (Friborg et al., 2003). RSA aims at tapping protective factors in three domains; dispositional, social and external resources (Friborg et al., 2003). RSA consists of six factors: (1) Perception of self, (2) Perception of future, (3) Social competence, (4) Structured style, (5) Family Cohesion and (6) Social resources (Hjemdal, Friborg, Stiles, Rosenvinge, & Martinussen, 2006).

RSA have been related to several outcomes pertaining to resilience. Individuals scoring high on RSA generally have better mental health (Friborg et al., 2003), experience painful stimuli as less disturbing (Friborg et al., 2006), are less affected by stressful life events (Hjemdal et al., 2006) and experience less hopelessness (Hjemdal et al., 2012).

1.7 RSA and personality

RSA in relation to personality has been addressed in a study by Friborg et al. (2005). They found small to large correlations between RSA and a personality measure in accordance with the five factor model (FFM) of personality (McCrae & Costa, 1997). Shared variance between RSA and FFM personality was investigated in a canonical correlation analysis. FFM personality explained 38% of variation in RSA, while RSA explained 42% of variance in FFM personality. In principal components analysis all RSA factors loaded significantly upon FFM personality factors, and FFM personality was found to account for 57% of variance in RSA. These results point to a noticeable amount of shared variance between RSA and FFM personality. Some shared variance between RSA and personality was expected, as RSA is intended to measure dispositional resilience, as well as social and external sources of resilience (Friborg et al., 2003). What could be potentially problematic is that because RSA seems to be closely related to personality, it is uncertain to what degree RSA is capturing the social and external resilience factors it was designed to capture (Friborg et al., 2003). Indeed, Friborg et al. (2005) note that RSA should be viewed as resilience factors as variants of personality factors not accounted for in the Five Factor model (FFM) of personality. Another way to interpret the relation Friborg et al. (2005) found between RSA and personality is to regard RSA to be substantially accounted for in the FFM framework.

However not all variance in RSA was accounted for by FFM personality. The variance in RSA not accounted for by FFM personality, could be variation due to trait resilience not captured in FFM, or it could be reflecting influence of contextual or social factors. An important question to answer is whether the variance in RSA not accounted for by personality, could predict variance in a criterion measure related to resilience.

Hjemdal et al. (2012) explored the incremental validity of RSA with hopelessness as criterion, beyond stressful life events, mood and personality. Personality was measured within the FFM

framework (McCrae & Costa, 1997). RSA accounted for 9% of variance in hopelessness, when controlled for the previously mentioned covariates. Thus RSA did show incremental validity above personality. RSA perception of future was the single variable accounting for most variance (8%) in hopelessness. It is possible that hopelessness is a particularly well-suited outcome measure for exploring incremental validity of RSA, as the RSA perception of future scale is particularly targeting hopes for the future. Personality accounted for 11% of variance in hopelessness, when controlled for negative life events and affective symptoms. A drawback of this study was that Hjemdal et al. did not explore to what degree RSA and personality accounted for the same variance in hopelessness. As Friborg et al. (2005) found RSA to share a substantial amount of variance with personality, one would expect RSA and personality to overlap by accounting for the same variance in a criterion measure. In addition, incremental validity of personality above RSA was not assessed, thus comparisons of the utility of RSA and personality could not be performed.

1.8 Purpose of the present study

1.8.1 Construct overlap between RSA and personality

As there is not yet agreement about which factors should be encompassed in definitions and models of resilience, it is important that scales claiming to measure resilience are clearly communicating which underlying factors are included, and which are not included in the scale. As disagreement in the resilience field is concerned with the role of personality in particular, it is important to further clarify the role of personality in RSA.

Since RSA in relation to personality have only been addressed in two studies (Friborg et al., 2005; Hjemdal et al., 2012), further studies are warranted. Furthermore, RSA in relation to personality has yet to be studied in a clinical population. The two studies of RSA by Friborg et al. (2005) and Hjemdal et al. (2012) were both conducted with healthy samples, military applicants and students, respectively. It is to be expected large individual differences in how much adversity the students and military applicants have experienced. As resilience is a phenomenon of positive adaption to adversity (Luthar et al., 2000), it may be important to study RSA in relation to personality in a population with SCI/MT.

Associations between RSA and FFM personality have previously been found (Friborg et al., 2005). Statistical associations between RSA and personality may arise because personality is

somehow influencing or co-varying with underlying factors measured in RSA. Or it may be that RSA is directly measuring personality as an underlying construct.

One way to explore whether RSA is directly measuring personality is to look for similar items in the RSA scale and scales assessing personality constructs, such as FFM, optimism, self-efficacy and locus of control. If item overlap is found, statistical association between RSA and personality may be attributed to RSA directly measuring personality.

1.8.2 Incremental validity and utility of RSA in relation to personality

The magnitude of shared variance between RSA and FFM personality is also an issue. Large shared variance, may suggest RSA to be less receptive of influence from social and external factors, than RSA is theorized to be (Friborg et al., 2003). If RSA capture little else than personality, the incremental validity of RSA should be questioned. Incremental validity above personality could be established if RSA could account for variance in a criterion measure, which personality could not account for. This would imply that RSA is capturing something that is not related to personality, but is influencing the criterion measure. Hjemdal et al. (2012) found incremental validity of RSA beyond FFM personality on hopelessness as criterion, but suggest future studies should employ broader measures as criterions.

The present study will explore incremental validity of RSA in a population with SCI/MT. Incremental validity of RSA beyond FFM personality and dispositional optimism will be explored. In a study by Vassend, Quale, Roise, and Schanke (2011) conducted on the same population involved in the present study, optimism predicted functional health status. Optimism could thus be relevant in the present study.

The present study employed health related quality of life is employed as criterion measure. Health related quality of life measures has become an increasingly popular addition to ordinary medical criteria, acknowledging the importance of individual's subjective experience of health and quality of life (Whitehurst, Engel, & Bryan, 2014). Health related quality of life assess the influence of health issues, on patients functioning in daily life and on mental health, and is thus regarded a relevant criterion measure in this population with SCI/MT.

Both in research and in clinical practice, one needs to be economical with regard to the number and length of assessments done. As RSA is known to be influenced by personality, RSA should be better than personality assessments to predict quality of life. Conversely if, personality is better in accounting for quality of life, the use of RSA is not warranted.

1.8.3 Research questions

The primary purpose of the present study was to investigate the extent to which RSA was capturing factors related to the phenomenon of resilience, beyond the contribution gained from personality factors encompassed in an established personality measure.

The present study seeks to address construct validity, incremental validity and utility of RSA. Construct validity of RSA in relation to personality will be explored by inspecting the content of the items of RSA. The RSA items will be compared to items from scales measuring FFM personality, dispositional optimism, and self-efficacy. Item inspection could explore to what degree RSA is directly measuring personality as underlying constructs. The present study will thus explore RSA in relation to personality as a broader concept than FFM personality.

Two research questions will be explored:

1. Does RSA grasp factors involved in resilience, above factors captured in an established measure of personality?
2. Could personality replace RSA in accounting for variation in quality of life?

Answering these research questions will inform the suitability of RSA to assess resilience in a SCI/MT population. To the best of my knowledge only three studies have compared the predictive powers of resilience scales and personality. However, the predictive powers of a resilience scale and a personality measure have never been compared in a population having faced serious injuries, such as SCI and MT.

2 Methods

2.1 Participants

Data used in the present study was collected in a follow up study, conducted at Sunnaas Rehabilitation hospital (SHR), the most specialized rehabilitation hospital in Norway. Participants were inpatients at SHR, with MTs, SCI or both. Exclusion criteria were severe cognitive deficits, psychosis or other psychiatric illness, insufficient understanding of Norwegian language or medical complications hindering practical conduction of interviews. The project was approved by the Regional Committee for Medical Ethics, South-East Norway.

Initial data collection took place from February 2007, through February 2009. In this period, a total of 125 patients were admitted to SHR. Of these 101 agreed to participate in the study, giving a response rate of 80.8%. Follow-up was conducted four years after discharge from SRH. At that point of time, 9 patients were deceased, 6 could not be located, and 1 was excluded as the diagnosis had been changed to multiple sclerosis, leaving 85 patients eligible for the follow-up. Of these 10 did not wish to participate, leaving us with a net sample of 75 patients and a response rate of 74.3%.

Analyses reported by Vassend et al. (2011) of differences between subjects participating in follow up, and those not, revealed that the non-participants had spent less time at the rehabilitation hospital, were less optimistic and had lower trait positive affect. Mean age of participants in the follow up was 45 years (s.d. 14.5) and 67% were men. In all, 65.8% had SCI, 31.5% had tetraplegia (paralysis of torso and limbs), and 34.2% had paraplegia (paralysis of the lower extremities), while 34.2% had MT. Severity of injuries were classified by the Abbreviated Injury scale (Baker, Oneill, Haddon, & Long, 1974). The NISS is the sum of squares of the three highest Abbreviated Injury Scale Scores (Osler, Baker, & Long, 1997). A MT was defined as NISS > 15, and at least two injuries classified in the Abbreviated Injury Scale. SCI was defined as damage to the spinal cord resulting in loss of function or sensation. Both patients with traumatically- (i.e. accidents) and non-traumatically acquired injuries (i.e., caused by infections or vascular lesions) were included. Data was collected by psychologists at SHR, department of Spinal Cord injury and multitrauma.

2.2 The Resilience Scale for Adults (RSA)

RSA is a self report scale designed to measure protective factors associated with resilience (Friborg et al., 2003). RSA is thoroughly described in the introduction section of this text, and will not be described here. In previous studies, RSA have shown acceptable reliability (Friborg et al., 2005; Hjemdal et al., 2012).

2.3 NEO-FFI

Personality was measured by NEO-FFI (Martinsen, Nordvik, & Østbø, 2005). NEO-FFI is an abbreviated 60-item measure of the Five Factor Model of personality (McCrae & Costa, 1997) assessing neuroticism, extroversion, openness, agreeableness and conscientiousness. The inventory is widely cross-culturally validated (McCrae & Costa, 1997). Internal consistency of the Norwegian language version of NEO-FFI is acceptable (Martinsen et al., 2005).

2.4 LOT-R

Dispositional optimism was measured by the Life Orientation Test-Revised (LOT-R) (Scheier, Carver, & Bridges, 1994). LOT-R consists of ten items, three items measuring optimism, three items measuring pessimism and four filler items. LOT-R assess generalized expectancies of positive versus negative outcomes, where higher scores suggest more optimism (Scheier et al., 1994). The LOT-R was administered four years prior to the follow-up.

2.5 The 36-item short form health survey (SF-36)

The SF-36 is a generic health related quality of life measure, consisting of 36 items, grouped into eight multi-item scales (Ware & Sherbourne, 1992). Health transition is an additional one-item measure of change in general health over the last year. Health transition is regarded a categorical variable (Ware & Sherbourne, 1992). In this study, a Norwegian language version of SF-36 (version 1.2), with copyright to the New England Medical Center Hospitals, Inc. was employed. The Norwegian translation of the SF-36 is both valid and reliable (Loge, Kaasa, Hjermstad, & Kvien, 1998). Content of the SF-36 scales is briefly described below:

2.5.1 SF-36 Physical functioning (10 items)

This scale measure to what degree the person is able to perform physical activities. A high score indicates that the person is able to perform all kinds of vigorous activities without limitations due to physical health. A low score will reflect that the individual is to a strong degree limited in performing all kinds of physical activities, including bathing and dressing (Ware & Sherbourne, 1992).

2.5.2 SF-36 Role limitations due to physical problems (4 items)

A low score reflects that the individual is experiencing problems with work or other daily activities, as a result of physical health. A high score indicates that the individual is not limited in work or other daily activities as a result of physical health (Ware & Sherbourne, 1992). Physical problems addressed is climbing stairs, walking moderate distances, carrying groceries, bending and kneeling (Ware & Sherbourne, 1992).

2.5.3 SF-36 Social functioning (2 items)

Social functioning reflects to what degree, and how often, emotional and physical problems interfere with normal social activities (Ware & Sherbourne, 1992).

2.5.4 SF-36 Bodily pain 2 (items)

This scale measure the frequency of bodily pain or discomfort the individual has experienced the last four weeks, and the extent to which the pain is affecting normal activities (Ware & Sherbourne, 1992).

2.5.5 SF-36 Mental health (5 items)

A low score indicates feelings of nervousness and depression, all the time, while a high score is feeling peaceful, happy and calm all of the time, for the past four weeks (Ware & Sherbourne, 1992). Anxiety, depression, loss of behavioral or emotional control and psychological well being, is addressed in this scale.

2.5.6 SF-36 Role limitations due to emotional problems (3 items)

Role limitations measure to what extent emotional problems limits work or other daily activities.

2.5.7 SF-36 Vitality (4 items)

The vitality scale is reflecting energy level and fatigue. A low scoring individual feels tired and worn out all of the time, while a high scoring individual feels full of pep and energy all of the time, during the past four weeks (Ware & Sherbourne, 1992).

2.5.8 SF-36 General health perceptions (5 items)

The general health perceptions scale is intended to reflect the personal beliefs the individuals holds about their health. Low scores indicate that the individuals believe that their health is poor, and likely will get worse. High scores indicate that the individual believe their health is excellent (Ware & Sherbourne, 1992).

2.6 Statistical analyses

Relations between RSA and NEO-FFI were explored with Pearson correlations, and linear multiple regression analyses. Linear multiple regression and hierarchical multiple regression analyses were used to explore the relative contribution to explained variance, and overlapping explained variance, of predictor variables (that is, NEO-FFI, RSA, NISS and LOT-R) on health related quality of life. The *F*-test was used to determine significance in change of explained variance (R^2) across blocks in hierarchical regression analyses. Because of small sample size, variables to be included in regression analyses were carefully selected, to maximize statistical power (Tabachnick & Fidell, 2007).

In order to reduce the number of statistical analyses, and simplify interpretation, a principal components analysis of SF-36 was performed. Based on item content and previous studies, SF-36 health transition was not included in the principal components analysis, because it measures change in health during the last year, and is thus regarded as qualitatively different from the other SF-36 scales (Ware et al., 1998; Ware & Sherbourne, 1992). The principal components analysis yielded two components, a mental SF-36 component and a physical SF-36 component. The two components were in line with previous research, with the exception of SF-36 general health perceptions, which loaded slightly stronger on the mental component than the physical component. Previous research have found SF-36 general health perceptions to load moderately on both the physical and the mental component, but in the majority of studies it loaded more on the physical component (Ware et al., 1998). In correlational analysis between SF-36 general health perceptions and SF-36 mental component (with SF-36

general health perceptions removed from the variable) and SF-36 physical component, general health perceptions correlated slightly stronger with the SF-36 mental component. The correlational analysis thus supported the inclusion of SF-36 general health perceptions in SF-36 mental component. Based on this principal components analysis an SF-36 physical component and an SF-36 mental component were employed as dependent variables in regression analyses. The SF-36 physical component encompassed three SF-36 scales; SF-36 bodily pain, SF-36 physical role limitations and SF-36 physical function. The SF-36 mental component contained five SF-36 scales; SF-36 vitality, SF-36 general health perceptions, SF-36 social functioning, SF-36 mental health and SF-36 emotional role limitations. Each subject's scores on the applicable SF-36 scales were simply added up, to create scores on the SF-36 physical component and mental SF-36 component. There was a weak positive correlation between SF-36 physical component and SF-36 mental component ($r = 0.28$).

Kurtosis and skewness for SF-36 mental component were -1.03 and -0.36 respectively. Negative kurtosis values indicate a distribution with many extreme cases (Tabachnick & Fidell, 2007). Negative skewness indicates a clustering of cases at the high end of the graph (Tabachnick & Fidell, 2007), indicating that patients perceived their mental health as good. For SF-36 physical component kurtosis was -0.45, reflecting a number of extreme cases (Tabachnick & Fidell, 2007), and skewness was positive 0.75. Positive skewness indicates a clustering of scores around the lower end of the scale (Tabachnick & Fidell, 2007), likely reflecting impact of injuries on physical aspects of health related quality of life.

Initial data screening was done prior to analysis. For NEO-FFI the numbers of respondents were 70, for RSA it was 71 and for SF-36 it was 73. To check if any data were erroneously entered, all scales were checked for scores outside possible range. No out of range scores were detected.

A few possible outliers were detected with boxplots. Scatterplots of all independent variables revealed no distinct outliers. Bivariate scatterplots between independent variables (that is, NEO-FFI, RSA and LOT-R) and both SF-36 physical component and SF-36 mental component were generated. Bivariate scatterplots to explore the possibility of multivariate outliers between RSA and NEO-FFI were also generated. None of the scatterplots revealed any obvious outliers, thus all cases were retained for analyses. Even though the sample size

where relatively small, inspection of the residual scatterplots from the regression analyses suggests the data set was acceptable for regression analyses (Tabachnick & Fidell, 2007).

2.7 Demographic variables

Age, education, marital status and sex are known to influence SF-36 scales in the Norwegian population (Loge & Kaasa, 1998). Preparatory correlation and regression analysis showed no significant effects of injury severity (that is, NISS), sex or marital status. Age was a significant predictor of the SF-36 physical component, while education significantly predicted both the physical and the mental SF-36 components. Consequently in regression analyses with SF-36 physical component as dependent variable, age and education were included, while in regression analyses with SF-36 mental component as dependent variable, only education was included. But as age and education in regression analyses along with NEO-FFI and RSA, were no longer significantly accounting for SF-36, age and education were left out of final analyses.

3 Results

As shown in Table 1 the patients on average experienced lower health related quality of life compared to the Norwegian population, on all SF-36 scales (Loge & Kaasa, 1998).

Table 1. *Mean SF-36 scale scores (SD) by gender. Norms from the Norwegian population (Loge & Kaasa, 1998) are reported. (Higher scores indicate better health (n = 73))*

	Males *n* = 48	Females *n* = 25
Norms physical functioning	89,8 (15,5)	84,8 (20,8)
Physical functioning	42,0 (31,1)	46,4 (32,2)
Norms role limitations, physical	80,5 (33,6)	75,4 (37,7)
Role limitations, physical	7,6 (37,3)	26,0 (37,8)
Norms role limitations, emotional	84,5 (29,7)	79,1 (34,6)
Role limitations, emotional	69,5 (41,2)	50,6 (47,3)
Norms bodily pain	77,2 (25,0)	73,0 (26,6)
Bodily pain	43,6 (29,8)	42,4 (26,2)
Norms social functioning	87,6 (20,9)	83,7 (23,1)
Social functioning	65,5 (33,8)	62,3 (23,8)
Norms mental health	80,0 (15,8)	77,6 (17,0)
Mental health	72,3 (20,6)	65,0 (22,7)
Norms vitality	63,2 (19,9)	56,9 (21,2)
Vitality	46,0 (22,7)	42,4 (23,2)
Norms general health perceptions	77,4 (21,3)	76,3 (22,5)
General health perceptions	56,3 (25,4)	55,8 (21,9)
Health transition	59,6 (26,1)	53,6 (27,4)

3.1 Relation RSA and NEO-FFI

As shown in Table 2, all NEO-FFI variables except openness, correlated significantly with the RSA scales. All significant correlations were positive, except correlations with neuroticism. Agreeableness was weakly related to RSA scores, with only one significant correlation (with RSA family cohesion). Most of the correlations between each of the RSA scales and neuroticism, extroversion and conscientiousness were moderate to strong. Attenuation corrected correlations were calculated for all significant correlations between NEO-FFI and RSA. Calculations were based on reliability coefficients for Norwegian versions of RSA (as reported by Hjemdal et al. (2012)) and NEO-FFI (Martinsen et al., 2005). As shown in Table 3, several of the corrected correlation coefficients were substantially higher than the corresponding uncorrected coefficients.

Table 2. *Correlations between NEO-FFI and RSA*

	Neuroticism	Extroversion	Openness	Agreeableness	Conscientiousness
RSA perception of self	-0.73**	0.55**	0.03	0.00	0.47**
RSA perception of future	-0.51**	0.49**	0.14	0.06	0.42**
RSA social competence	-0.26*	0.72**	0.21	0.05	0.36**
RSA family cohesion	-0.44**	0.54**	-0.19	0.27*	0.46**
RSA social resources	-0.35**	0.48**	-0.03	0.23	0.38**
RSA structured style	-0.22	0.40**	-0.13	0.09	0.58**
RSA total	-0.56**	0.69**	0.02	0.15	0.56**

RSA, the Resilience Scale by Friborg et al. (2005).
*p < 0.05.
**p < 0.01.

Table 3. *Attenuation corrected correlations between NEO-FFI and RSA*

	Neuroticism	Extroversion	Openness	Agreeableness	Conscientiousness
RSA perception of self	-0.87**	0.68**			0.58**
RSA perception of future	-0.61**	0.62**			0.52**
RSA social competence	-0.32*	0.93**			0.46**
RSA family cohesion	-0.53**	0.68**		0.37*	0.58**
RSA social resources	-0.42**	0.61**			0.48**
RSA structured style		0.55**			0.78**
RSA total	-0.63**	0.82**			0.67**

RSA, the Resilience Scale by Friborg et al. (2005).
*p < 0.05.
**p < 0.01.

Multiple regression analyses were used to explore the ability of NEO-FFI to explain variance in RSA scales. Only NEO-FFI variables which significantly correlated with the RSA scale in question were included in regression analyses. Results displayed in Table 4 revealed that NEO-FFI explained a large amount of the variance in all RSA variables. Of note, NEO-FFI accounted for more than half the variance in RSA perception of self, RSA social competence and RSA total, suggesting that these scales share substantial variance with personality.

Table 4. *Results of multiple regression analyses RSA predicted by NEO-FFI*

	R^2
RSA perception of self	0.61**
RSA perception of future	0.36**
RSA social competence	0.52**
RSA family cohesion	0.41**
RSA social resources	0.27**
RSA structured style	0.35**
RSA total	0.59**

*p < 0.05.
**p < 0.01.

3.2 RSA, NEO-FFI and LOT-R predicting health related quality of life

Pearson correlations between each of the SF-36 scales and RSA and NEO-FFI are displayed in Table 5. The significant coefficients ranged from weak (0.24) to strong (0.71). Correlation coefficients for SF-36 scales included in SF-36 mental component were generally larger than correlation coefficients for SF-36 scales included in SF-36 physical component, suggesting a stronger relation between mental aspects of health related quality of life and personality and RSA, than between physical aspects of health related quality of life and personality and RSA. RSA total significantly correlated with all SF-36 scales, except SF-36 physical functioning. RSA perception of future was the only variable significantly correlating with all SF-36 scales, suggesting that RSA perception of future capture clinically important aspects. Agreeableness was the variable least related to SF-36, with only one significant correlation (to SF-36 social functioning). SF-36 physical functioning was the SF-36 scale least related to personality and RSA. Only openness and RSA perception of future significantly correlated with SF-36 physical functioning.

Table 5. C*orrelations between each SF-36 scale, NEO-FFI and RSA*.

	N	E	O	A	C	RSA perception of self	RSA perception of future	RSA social competenc	RSA family cohesion	RSA social resources	RSA structured style	RSA total
SF-36 Physical functioning	0.02	0.09	0.29*	0.09	-0.04	0.09	0.24*	0.01	0.06	-0.01	-0.03	0.08
SF-36 Physical role	-0.28*	-0.33**	0.26*	0.01	0.16	0.35**	0.42**	0.22	0.18	0.12	0.07	0.31**
SF-36 Emotional role	-0.61**	0.46**	0.09	0.08	0.41**	0.56**	0.46**	0.36**	0.38**	0.35**	0.21	0.51**
SF-36 Bodily pain	-0.30*	0.17	0.23	0.08	0.07	0.27*	0.45**	0.06	0.20	0.17	0.19	0.29*
SF-36 Social functioning	-0.38**	0.45**	0.14	0.26*	0.31**	0.44**	0.54**	0.39**	0.44**	0.43**	0.29*	0.55**
SF-36 Mental health	-0.70**	0.45**	-0.01	0.17	0.41**	0.71**	0.52**	0.41**	0.58**	0.55**	0.32**	0.68**
SF-36 Vitality	-0.42**	0.53**	0.09	0.10	0.31**	0.56**	0.63**	0.47**	0.48**	0.47**	0.41**	0.66**
SF-36 General health perceptions	0.39**	0.40**	0.06	0.10	0.21	0.54**	0.58**	0.29*	039**	0.40**	0.28*	0.54**
Sf-36 Health transition	-0.30*	0.26*	0.12	-0.02	0.27*	0.33**	0.43**	0.20	0.24*	0.10	0.14	0.32**
SF-36 Physical summary	-0.23	0.25*	0.31**	0.07	0.08	0.29*	0.45**	0.12	0.18	0.11	0.09	0.27*
SF-36 Mental summary component	-0.62**	0.56**	0.10	0.17	0.42**	0.68**	0.66**	0.47**	0.54**	0.52**	0.35**	0.71**

N, NEO-FFI neuroticisms; E, NEO-FFI extroversion; O, NEO-FFI openness; A, NEO-FFI agreeableness; C, NEO-FFI conscientiousness.
** $p < 0.01$.
*$p < 0.05$.

Table 6. *Results of regression analyses predicting SF-36 physical component and SF-36 mental component from RSA and NEO-FFI.*

	N	E	O	A	C	RSA perception of self	RSA perception of future	RSA social competence	RSA family cohesion	RSA social resources	RSA structured style	RSA total
SF-36 physical component	0.05	0.06*	0.10**	0.01	0.01	0.08*	0.20**	0.02	0.03	0.01	0.01	0.08*
SF-36 mental component	0.39**	0.32**	0.01	0.03	0.17**	0.47**	0.43**	0.22**	0.29**	0.27**	0.12**	0.50**

N, NEO-FFI neuroticisms; E, NEO-FFI extroversion; O, NEO-FFI openness; A, NEO-FFI agreeableness; C, NEO-FFI conscientiousness.
** $p < 0.01$.
*$p < 0.05$.

3.3 Regression with SF-36 mental component and SF-36 physical component

A series of simple regression analyses with all NEO-FFI variables and all RSA variables each predicting SF-36 mental component and SF-36 physical component, were conducted to investigate the predictive powers of single variables (Table 6). RSA perception of future was the best predictor of SF-36 physical component, while RSA total was the best predictor of SF-36 mental component. However, regression analyses with single predictors do not take shared variance between predictors into account.

Hierarchical regression analyses were used to explore incremental validity of RSA scales over and above personality, in explaining health related quality of life. Results are displayed in Table 7. Based on results from simple regression analyses (Table 6), only NEO-FFI significantly predicting SF-36 were included in the analyses. In analyses with SF-36 mental component as dependent variable, neuroticism, extroversion and conscientiousness were entered simultaneously in step one, while each RSA variable were entered in step two. In analyses with SF-36 physical component as dependent variable, neuroticism and extroversion were added in step one, and RSA variables were added in the second step.

The results suggest the greater part of the variance in SF-36, which is explained by RSA, is also explained by personality variables. Or in other words, RSA and personality account for largely the same variance in health related quality of life. Only three RSA scales showed incremental validity beyond personality. RSA perception of future was the RSA scale with most incremental validity beyond personality; it showed incremental validity with regard to both mental and physical aspects of health related quality of life. No other RSA scales showed incremental validity on the SF-36 physical component. This supports the clinical importance of RSA perception of future, implied in correlational analyses (Table 5). In addition to RSA perception of future, RSA perception of self and RSA total showed incremental validity relative to personality, in explaining SF-36 mental component.

Table 7. *Results of hierarchical regression analyses of single RSA scales predicting SF physical and mental scales. The two columns on the left show RSA used in simple regression analyses as single predictors. The two columns to the right show RSA added in hierarchical regression analyses in step 2, after NEO-FFI variables were added in step 1.*

	RSA added alone		RSA added after NEO-FFI	
	SF-36 mental component ΔR^2	SF-36 physical component ΔR^2	SF-36 mental component ΔR^2	SF-36 physical component ΔR^2
RSA perception of self	0.47**	0.08*	0.05**	0.05
RSA perception of future	0.43**	0.20**	0.09**	0.14**
RSA social competence	0.22**	0.02	0.02	0.01
RSA family cohesion	0.29**	0.03	0.03	0.03
RSA social resources	0.27**	0.01	0.05*	0.00
RSA structured style	0.12**	0.01	0.01	0.00
RSA total	0.50**	0.08*	0.09**	0.04

*$p < 0.05$.
**$p < 0.01$.

Multiple linear regression analyses were used to explore whether several variables within RSA and NEO-FFI accounted for the same variance in SF-36. All RSA scales were added simultaneously in regression analyses to predict each SF-36 component. Corresponding analyses was done with NEO-FFI as predictor variables. When all RSA variables were entered simultaneously, only RSA perception of future significantly accounted for SF-36 physical component, while RSA perception of self and RSA perception of future significantly accounted for SF-36 mental component (Table 8). Linear regression analysis with all NEO-FFI variables entered simultaneously revealed that only openness significantly predicted SF-36 physical component, while neuroticism and extroversion significantly predicted SF-36 mental component (Table 9). Since a larger number of variables, both from RSA and NEO-FFI, significantly predicted SF-36 mental component and SF-36 physical component when entered alone as single predictors, the results suggest that several variables within RSA and NEO-FFI account for the same variance in health related quality of life. Furthermore, RSA accounted for more variance in both SF-36 mental component and SF-36 physical component, than NEO-FFI did. The difference was largest for SF-36 physical component, where RSA explained 7% more variance than personality.

Table 8. *Results of multiple regression analyses with all RSA variables entered simultaneously, as independent variables, predicting SF-36 physical component and SF-36 mental component*

	SF-36 physical component		SF-36 mental component	
	R^2	β	R^2	β
RSA	0.23**		0.52**	
RSA perception of self		-0.13		0.31*
RSA perception of future		0.60**		0.31*
RSA social competence		-0.01		0.09
RSA structured style		0.17		0.10
RSA family cohesion		-0.15		0.12
RSA social resources		-0.16		-0.04

*p < 0.05.
**p < 0.01.

Table 9. *Multiple regression analysis with all NEO-FFI variables entered simultaneously as independent variables, predicting SF-36 physical component and SF-36 mental component.*

	SF-36 physical component		SF-36 mental component	
	R^2	β	R^2	β
NEO-FFI	0.16*		0.50**	
Neuroticism		-0.18		-0.44**
Extroversion		0.10		0.28*
Openness		0.29*		0.03
Agreeableness		0.08		0.08
Conscientiousness		-0.04		0.12

*p < 0.05.
**p < 0.01.

Next, significant predictors from separate regression analyses with RSA and NEO-FFI (Table 8 and Table 9, respectively) were assembled in regression analyses, to predict SF-36. In analysis predicting SF-36 physical component, openness and RSA perception of future were entered together (Table 10). In analysis with SF-36 mental component as dependent variable, neuroticism, extroversion, RSA perception of self and RSA perception of future were entered at the same time (results in Table 11). Results of analyses of SF-36 physical component (Table 10) show that both Openness and RSA perception of future account for less variance

than they did in regression analyses with RSA and NEO-FFI separately (Table 8 and Table 9 respectively), indicating overlap in explained variance. RSA perception of future was a better predictor of SF-36 physical component than openness. Results from regression analysis predicting SF-36 mental component (Table 11), show that RSA perception of self is no longer a significant predictor. This indicates overlapping explained variance in SF-36 mental component, between RSA perception of self and NEO-FFI variables in the analysis. Beta values for neuroticism and extroversion decreased compared to separate NEO-FFI analyses (Table 9), while beta value for RSA perception of future increased slightly, supporting the relative predictive validity of RSA perception of future.

Table 10. *Multiple regression analysis with RSA and NEO-FFI variables entered simultaneously, predicting SF-36 physical component*

	SF-36 physical component	
	R^2	β
NEO-FFI/RSA	0.26**	
Openness		0.25*
RSA perception of future		0.41**

*p < 0.05.
**p < 0.01.

Table 11. *Multiple regression analysis with RSA and NEO-FFI variables entered simultaneously, predicting SF-36 mental component*

	SF-36 mental component	
	R^2	β
NEO-FFI/RSA	0.58**	
Neuroticism		-0.27*
Extroversion		0.20*
RSA perception of self		0.13
RSA perception of future		0.32*

*p < 0.05.
**p < 0.01.

3.4 Incremental validity of RSA vs. NEO-FFI

Hierarchical regression analyses were performed to investigate incremental validity of RSA relative to NEO-FFI, and vice versa. Only RSA variables and NEO-FFI variables significantly predicting SF-36 mental component and/or SF-36 physical component in separate analyses with RSA and NEO-FFI (Table 8 and Table 9, respectively) were included in the analyses. For each dependent variable, RSA variables were entered in step one, then NEO-FFI variables were entered in step two,- to explore incremental validity of NEO-FFI. Next, similar hierarchical regression analyses were performed, but this time NEO-FFI variables were entered in step one, and RSA variables entered in step two, to explore incremental validity of RSA. Independent variables in analyses of SF-36 mental component were neuroticism, extroversion, RSA perception of self and RSA perception of future. Independent variables in analyses of SF-36 physical component were openness and RSA perception of future. Results (Table 12) from the hierarchical regression analyses revealed that RSA and NEO-FFI accounted for similar amounts of variance in SF-36 mental component. Compared to NEO-FFI openness, RSA accounted for twice the amount of variance in SF-36 physical component. Thus RSA is a better predictor for physical aspects of health related quality of life, while the performances of RSA and personality are similar in predicting mental aspects of health related quality of life. Comparing RSA added in step two to RSA added in step one (Table 12), reveal that the bulk of explained variance in SF-36 physical component does not overlap with personality. While the major part of variance in SF-36 mental component, explained by RSA, is shared with personality. This further support that RSA perception of future is tapping aspects related to physical health related quality of life, which are not related to personality.

Table 12. *Results of hierarchical multiple regression analysis predicting SF-36 mental component and SF-36 physical component from NEO-FFI and RSA*

	Step 1	Step 2	Step 1	Step 2
	RSA	NEO-FFI	NEO-FFI	RSA
	R^2	ΔR^2	R^2	ΔR^2
SF-36 mental component	0.51**	0.07**	0.48**	0.10**
SF-36 physical component	0.20**	0.06*	0,10**	0.16**

*p < 0.05.
**p < 0.01.

3.5 Incremental validity of RSA perception of future above optimism

To further explore the validity of RSA perception of future, incremental validity above optimism was explored. Optimism was measured by LOT-R at admission to rehabilitation hospital four years prior to the follow up. Correlations between LOT-R and RSA perception of future, SF-36 physical component and SF-36 mental component are displayed in Table 13. LOT-R was significantly associated with RSA perception of future and mental aspects of health related quality of life, but not to physical aspects of health related quality of life.

Hierarchical regression analyses with NEO-FFI variables entered in step one, optimism (that is, LOT-R) entered in step two, and RSA perception of future entered in step three, were conducted. NEO-FFI variables included in analysis of SF-36 mental component were neuroticism and extroversion, while openness were the only NEO-FFI variable included in analysis of SF-36 physical component. Results are shown in Table 14. While RSA perception of future accounted for 16% of variance in SF-36 physical scale beyond personality (Table 12), RSA perception of future accounted for 12% of variance in SF-36 physical component above personality and optimism. Explained variance decreased slightly less in analyses of SF-36 mental component (from 10% to 8%).

Table 13. *Correlations between LOT-R and RSA perception of future, SF-36 physical component and SF-36 mental component*

	LOT-R
RSA perception of future	0.36**
SF-36 physical component	0.22
SF-36 mental component	**0.37****

*p < 0.05.
**p < 0.01.

Table 14. *Results of hierarchical regression analyses predicting SF-36 mental component and SF-36 physical component, from optimism (that is, LOT-R) and RSA perception of future*

	Step 1	Step 2	Step 3
	NEO-FFI	LOT-R added	RSA perception of future added
	ΔR^2	ΔR^2	ΔR^2
SF-36 mental component	0.48**	0.02	0.08**
SF-36 physical component	0.10*	0.06	0.12**

NEO-FFI variables included in analysis of SF-36 mental component were neuroticism and extroversion. NEO-FFI variables included in analyses of SF-36 physical component were openness.
*p < 0.05.
**p < 0.01.

3.6 Incremental validity of RSA perception of future above injury severity

To explore incremental validity of RSA perception of future above injury severity (that is, NISS) hierarchical regression analyses with NISS added in step one, and RSA perception of future added in step two, were performed (Table 15). NISS was measured at the initial stages of the study, four years prior to the follow up when most data in this study was collected. Results in Table 15 suggest that incremental validity of RSA perception of future above personality is not related to injury severity affecting RSA perception of future scores.

Table 15. *Results of hierarchical regression analyses predicting SF-36 mental component and SF-36 physical component, from injury severity (that is NISS) and RSA perception of future*

	Step 1	Step 2
	NISS	RSA perception of future added
	ΔR^2	ΔR^2
SF-36 mental component	0.00	0.43**
SF-36 physical component	0.03	0.21**

*p < 0.05.
**p < 0.01.

4 Discussion

The aims of the present study were to investigate construct overlap between RSA and personality. Personality concepts employed in the present study were FFM personality, dispositional optimism and self-efficacy. Furthermore, incremental validity of RSA relative to personality traits was explored, as well as whether personality could replace RSA in explaining health related quality of life. Empirical evidence for overlap between RSA and personality was presented in the introduction (Friborg et al., 2005; Hjemdal et al., 2012). Even though substantial statistical associations between RSA and FFM personality have been demonstrated (Friborg et al., 2005; Hjemdal et al., 2012), Hjemdal et al. (2012) found incremental validity for RSA beyond FFM personality in accounting for hopelessness in a student sample. Results from the present study suggest that NEO-FFI and RSA share substantial amounts of variance. Likewise, RSA and NEO-FFI also accounted for roughly the same variance in health related quality of life. However, in accordance with findings by Hjemdal et al. (2012), one RSA variable, RSA perception of future showed notable incremental validity beyond FFM personality.

4.1 Is RSA measuring personality?

The results from correlational and regression analyses suggest substantial relations between RSA and personality. Neuroticism, extroversion and conscientiousness was related to several RSA scales, while agreeableness was significantly but weakly related to RSA family cohesion only. Openness was not significantly related to any RSA scales. Previous studies have found stronger relations between agreeableness, openness and RSA (Friborg et al., 2005), but the inconsistency in findings suggests that RSA is not directly measuring agreeableness or openness.

Carlson and Herdman (2012) argue that correlations between two instruments exceeding 0.70, indicate that the instruments are similar enough to be used as proxies for one another. Two RSA scales showed correlations with personality above 0.70. RSA perception of self correlated -0.73 (attenuation corrected correlation -0.87) with neuroticism, and RSA social resources correlated 0.72 (attenuation corrected correlation 0.93) with extroversion. A relatively strong correlation of 0.58 (attenuation corrected correlation 0.78) between RSA structured style and conscientiousness was also found. Interestingly, the RSA total score also

had a high correlation of 0.69 with extroversion (attenuation corrected correlation 0.82). In psychological research, the sizes of the correlation coefficients are regarded as large, supporting the possibility that some RSA scales may directly measure FFM personality as underlying construct.

Given that RSA perception of self, RSA social competence and RSA structured style are mainly assessing FFM personality, the correlations found in the present study between these RSA scales and FFM personality, should correspond with correlations found in previous research. Hjemdal et al. (2012) and Friborg et al. (2005) found high correlations between RSA perception of self and neuroticism (≥0.70), between RSA social competence and extroversion (≥ 0.68) and between RSA structured style and conscientiousness (≥ 0.70). The strong correlations between these RSA scales and FFM personality found in three studies, conducted on different populations, indicate that these RSA scales primarily measure personality as underlying constructs. Hjemdal et al. (2012) found a weaker correlation between extroversion and RSA total (r = 0.58) suggesting that extroversion is still related to RSA, and that the extroversion trait was more strongly related to RSA variables in the present study.

4.2 Item overlap between RSA and personality

To explore whether the observed statistical associations between RSA and NEO-FFI, were due to RSA measuring personality as underlying construct, content of RSA items were inspected with regard to similarity to content of NEO-FFI variables.

4.2.1 RSA perception of self

RSA perception of self consists of six items:

1. When something unforeseen happens (I always find a solution / I often feel bewildered)
2. My personal problems (are unsolvable / I know how to solve)
3. My belief in myself (help me trough tough times / doesn't help in tough times)
4. My judgments and decisions (I often doubt / I trust completely)

5. In difficult periods I have a tendency to (view everything gloomy / find something good that help me)
6. Events in my life that I cannot influence (I manage to come to terms with / are a constant source of worry/concern)

The essence in RSA perception of self seems to be faith in oneself and ones abilities, and tendencies to doubt and worry. Items regarding these qualities are found in NEO-FFI neuroticism. NEO-FFI items nr. 1, 16 and 21 involve tendencies to worry, items nr. 41 and 51 have to do with faith in oneself and ones abilities.

- I'm not a worrier (1).
- I seldom feel lonely or down (16).
- I often feel tense and nervous (21).
- When things go wrong, I too often feel discouraged and want to give up (41)
- I often feel helpless and want someone else to solve my problems (51).

The similarity of content of RSA perception of self and items from neuroticism, suggest that RSA perception of self may be measuring neuroticism as underlying construct. This notion is supported by the high correlations between RSA perception of self and neuroticism observed in the present study, as well as by Friborg et al. (2005) and by Hjemdal et al. (2012).

4.2.2 RSA social competence

RSA social competence consists of six items:

1. I enjoy being (together with other people / by myself).
2. To be flexible in social settings (is not important to me / is really important to me)
3. New friendships are something (I make easily / I have difficulty making)
4. Meeting new people is (difficult for me / something I am good at)
5. When I am with others (I easily laugh / I seldom laugh).
6. For me, thinking of good topics for conversation is (difficult / easy).

RSA social competence is predominantly focusing on perceived abilities in social interactions, but does also include items about valuing and enjoying the company of others. NEO-FFI items nr. 2, 17 and 42 belonging to extroversion, mainly regard valuing and enjoying the company of others, and is to a lesser degree about perceived social abilities. Although item

nr.17 might somewhat tap into perceived social abilities, given that one perceives being lively as an advantage in social settings.

- I like to surround myself with people (2).
- I very much enjoy chatting to people (17).
- I don't get much pleasure from chatting with people (42).
- I'm a merry, lively person (37).

Compared to RSA social competence, extroversion is to a lesser degree asking for perceived social abilities, but to a larger degree focusing on whether one enjoy being with other people. Even so the similarities in content between RSA social competence and extroversion, suggest that some items in RSA social competence are directly measuring extroversion as underlying construct, but that extroversion does not encompass all aspects of RSA social competence. High correlations between RSA social competence and extroversion were found in the present study and in both previous studies, supporting possible construct overlap between RSA social competence and extroversion (Friborg et al., 2005; Hjemdal et al., 2012).

4.2.3 RSA Family cohesion and RSA social resources

The correlation coefficients for both RSA family cohesion and RSA social resources found in the present study deviate from those found in previous studies, suggesting that these variables are not consistently reflecting personality as underlying construct.

RSA family cohesion consists of six items:

1. My familys´ understanding of what is important in life is (quite different than mine / very similar to mine)
2. I feel (very happy with my family / very unhappy with my family)
3. My family is characterized by (disconnection /healthy coherence)
4. In difficult periods my family (keeps a positive outlook on the future / views the future as gloomy)
5. Facing other people, our family acts (unsupportive of one another / loyal towards one another)
6. In my family we like to (do things on our own / do things together).

RSA social resources consist of seven items:

1. I can discuss personal issues with (no one / friends/family-members)
2. Those who are good at encouraging me are (no one / some close friends/family members).
3. The bonds among my friends is (weak / strong)
4. When a family member experiences a crisis/emergency (I am informed right away / it takes quite a while before I am told)
5. I get support from (friends/family members / No one)
6. When needed, I have (no one who can help me / always someone who can help me)
7. My close friends/ family members (appreciate my qualities / dislike my qualities)

Items in both RSA family cohesion and RSA social resources seem to touch upon perceived support, trust and sense of belonging. In addition, one item from RSA family cohesion might be tapping into optimism, or tendencies to worry which is part of neuroticism: "In difficult periods my family (keeps a positive outlook on the future / views the future as gloomy)". Perceived support might be partially captured in NEO-FFI items from neuroticism: Item nr. 16 "I seldom feel lonely or down" and to some degree item nr. 36 "I often get angry at the way people treat me". While item nr. 2 "I like to surround myself with people", is possibly related to a sense of belonging. In addition, items from the agreeableness factor may be influenced by trust and a sense of belonging: Item nr. 29 "If somebody offends me, I try to forgive and forget", Item nr. 49 "I generally try to be thoughtful and considerate", Item nr. 54 "If I don't like someone, I'll let them know" as well as item nr. 59 "If necessary I'm willing to manipulate others to have it my way."

4.2.4 RSA structured style

RSA structured style is emphasizing a preference for structure, and ability to organize oneself. RSA structured style consist of four items:

1. I am at my best when (I have a clear goal to strive for / can take one day at a time)
2. When I start on new things/projects (I rarely plan ahead, just get on with it / I prefer to have thorough plan)
3. Rules and regular routines (are absent in my everyday life / simplify my everyday life)
4. I am good at (organizing my time/ wasting my time)

NEO-FFI items encompassing these concepts belong to the conscientiousness factor. NEO-FFI items nr. 10, 30, 55 and 15 has to do with ability to organize, while items nr. 25 and 35 reflect a preference for structure.

- I'm pretty good about pacing myself so as to get things done on time. (10).
- I often get into situations, without being fully prepared (15).
- I set clear goals and work systematically to reach them (25).
- I waste a lot of time before I get started with work (30).
- I work hard at reaching my goals (35).
- It seems I'm never able to organize myself (55).

Content overlap suggests that RSA structured style and NEO-FFI conscientiousness, may both be measuring the same personality construct, explaining the high correlations found in the present study and in previous studies (Friborg et al., 2005; Hjemdal et al., 2012).

4.2.5 RSA perception of future

RSA perception of future consists of four items. The items regard hope for the future, planning and setting goals for the future, and beliefs in own abilities to reach these goals. Friborg et al. (2005) describe RSA perception of future as measuring individuals' beliefs about opportunities to reach future goals.

1. My plans for the future are (difficult to accomplish / possible to accomplish)
2. My future goals (I know how to accomplish / I am unsure how to accomplish)
3. I feel that my future looks (very promising / uncertain)
4. My goals for the future are (unclear / well thought through)

Items from conscientiousness "I have clear goals and work systematically to reach them" (NEO-FFI item nr. 25) and "I work hard to reach my goals" (NEO-FFI item nr. 35) encompass having clear goals, and actively working towards them. RSA perception of future was moderately correlated with conscientiousness. But what was not captured in conscientiousness is the beliefs in own abilities to reach ones goals, and a positive outlook on the future. Hope for the future may be partly found in items from the neuroticism scale, related to worrying "I am not a worrier" (NEO-FFI item nr.1), while belief in own abilities may be captured in an item from neuroticism regarding helplessness "I often feel helpless and want someone else to solve my problems" (NEO-FFI item nr.51). RSA perception of future

correlated moderately with both conscientiousness and neuroticism, and similar correlations are found in previous studies (Friborg et al., 2005; Hjemdal et al., 2012). However, FFM personality does not seem to fully capture a positive view on the future and faith in ones abilities to reach ones goals, which is part of RSA perception of future. On the other hand, other well established concepts, such as optimism and self-efficacy may capture these aspects. Items from the Life Orientation test (LOT-R) reflect positive expectancies towards the future, which seems to be part of RSA perception of future. For instance "In uncertain times, I usually expect the best" and "I'm always optimistic about my future". Even so, optimism as measured in LOT-R reflects a passive expectation of positive outcomes, while in RSA perception of future, positive outcomes are related to behaviour: "My plans for the future are (difficult to accomplish / possible to accomplish) and "My future goals (I know how to accomplish / I am unsure how to accomplish)".

Additionally, the self-efficacy construct may resemble RSA perception of future. Items from the Self-efficacy Scale (Sherer, Maddux, Mercandante, Prenticedunn, & Jacobs, 1982), taps into beliefs in own abilities to reach goals. Examples of items from the Self-efficacy Scale are: "When I make plans I'm certain I can make them work", "When I set important goals for myself I rarely achieve them", "Failure just makes me try harder", "I avoid trying to learn new things when they look too difficult for me" and "I feel insecure in my ability to do things". Content overlaps between items of RSA perception of future suggest that RSA perception may be encompassing self-efficacy as underlying construct.

RSA perception of future might also reflect the locus of control construct since locus of control reflects individuals generalized expectations of to what degree they feel that their behavior can impact outcomes (Rotter, 1966). Overall, it seems likely that RSA perception of future to some degree reflects well-established measures of personality dispositions, such as FFM, dispositional optimism, self efficacy and locus of control.

In total, the inspections of RSA items suggest that RSA perception of self, RSA social resources and RSA structured style, may to a large degree reflect FFM personality. Other RSA variables are to a lesser degree overlapping with the FFM personality construct. While RSA perception of future could possibly tap into other concepts of personality, such as optimism, self-efficacy and locus of control. This agrees with the findings of Friborg et al. (2005). Friborg et al. (2005) described RSA as resilience factors as variants of personality not

accounted for in FFM. However, item overlaps between RSA and personality concepts, suggest that some RSA factors conceptualized as resilience factors by Friborg et al. (2005) may be reflecting well-established personality constructs.

4.3 Does RSA grasp factors involved in resilience, above factors captured in an established measure of personality?

Results of hierarchical regression analyses show that RSA did account for variance in health related quality of life, beyond FFM personality (Table 12). RSA explained more variance beyond personality in physical aspects of health related quality of life (16%), than mental aspects of health related quality of life (10%). The results show that incremental validity of RSA beyond FFM personality was largely due to RSA perception of future alone. This is in line with the findings of Hjemdal et al. (2012), where RSA perception of future was the RSA variable explaining the largest amount of variance in hopelessness (8%), beyond FFM personality. Item inspection of RSA perception of future could imply that this variable may predominantly be measuring personality constructs, in line with the findings of Friborg et al. (2005). The results of the present study could thus indicate that RSA may predominantly capture personality factors, and to a lesser degree social and external factors contributing to resilience, despite the fact that RSA was designed to measure resilience factors in social and external domains, as well as personality (Friborg et al., 2003).

Overall, RSA does capture factors possibly related to resilience processes, beyond FFM personality. However, such factors could possibly be conceptualized as well-established personality constructs, as indicated by item overlap between RSA perception of future and optimism, self-efficacy and locus of control.

4.4 Could personality replace RSA in accounting for variation in quality of life

RSA and NEO-FFI performed equally well in accounting for mental aspects of health related quality of life, both measures accounted for about half of the variance (Table 12). Additionally, RSA and NEO-FFI accounted for largely the same variance in mental aspects

of health related quality of life, and each scale explained comparable amounts of variance beyond the other. However, most of the explained variance in physical aspects of health related quality of life was not shared by RSA and NEO-FFI (Table 12). Both openness and RSA perception of self captured unique variance in physical aspects of health related quality of life, but RSA perception of future accounted for more variance than openness (Table 10 and Table 12).

Consequently, RSA seems to be very suitable for use in populations with physical injuries. However, if RSA perception of future is reflecting personality constructs such as optimism, self-efficacy and locus of control, the results of the present study would indicate that these constructs could explain physical aspects of health related quality of life, beyond FFM personality.

Even so, RSA perception of future did account for health related quality of life beyond optimism (that is LOT-R). Still, as optimism was measured four years earlier, it is hard to tell whether the results would be different if all measurement were done at the same time. Thus the relation between RSA perception of future and optimism remains somewhat unclear.

Moreover, as this is a cross sectional study, it is not possible to determine the direction of the association between RSA perception of future and physical aspects of health related quality of life. Injury severity did not account for health related quality of life. The relation between RSA perception of future and physical aspects of health related quality of life, is thus not thought to be due to injury severity impacting both variables. However, a prospective study of patients at a trauma intensive care unit, found that illness perception measured one month post-discharge, was the strongest predictor of self-efficacy six months post-discharge (Connolly, Aitken, Tower, & Macfarlane, 2014). The study thus indicates that injury related variables might impact self-efficacy scores. In a review article of relation between self-efficacy and recovery in populations of osteoarthritis patients undergoing hip or knee replacement surgery, Magklara, Burton, and Morrison (2014), found that pre-operative self-efficacy was not consistently predicting disability. However, post-operative self-efficacy was consistently associated with recovery outcomes such as walking speed and degree of disability. Taken together, these findings suggest that self-efficacy in early phases might be influenced by perceived physical health, and that subsequently measured self-efficacy scores predict future physical outcomes. Although the present study is conducted in a different

population, and with different variables, the interaction between RSA perception of future and physical aspects of health related quality of life, could follow a similar pattern.

RSA perception of future did account for variance in health related quality of life beyond FFM personality, but the present study cannot inform whether this finding is due to RSA perception of future reflecting well-established personality constructs. As mentioned in the introduction, previous research has linked optimism, self-efficacy and locus of control to adaption after SCI.

In sum, FFM personality performed equally well as RSA, in accounting for mental aspects of health related quality of life. While RSA was better than FFM personality at accounting for physical aspects of health related quality of life.

5 Conclusion

Item inspection from the present study suggests that RSA may substantially be tapping into personality constructs such as FFM personality, optimism, self-efficacy and locus of control. Family cohesion and social support assessed in RSA was not substantially associated with to health related quality of life. Thus, RSA primarily personality related RSA variables were linked to health related quality of life, suggesting that resilience factors assessed by RSA are mainly personality dispositions. However RSA did account for health related quality of life beyond a measure of FFM personality, and may thus be regarded as a suitable for use in populations with SCI and MT. RSA perception of future was the RSA variable accounting for the largest amount of variance in health related quality of life. As item inspection suggests that RSA perception of future may be measuring optimism, self-efficacy and locus of control, the results could imply that measures of these personality constructs could be just as useful as RSA. Thus the findings of the present study may challenge the uniqueness of the resilience construct as operationalized by RSA. Furthermore, the use of scales with established construct validity could be advantageous, especially in research, because it allows the researcher to draw conclusions of the relationships between underlying variables. Further studies should thus explore incremental validity of RSA, beyond well-established personality concepts such as FFM, optimism, self-efficacy and locus of control. Such studies could elucidate if RSA, which is specifically targeted at measuring resilience, adds to our understanding of resilience, beyond well-established personality constructs.

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